may indicate how to align the first edge with a second edge that is opposite from the first edge on the swatch, while a third edge of the swatch may indicate how to align the third edge with a fourth edge that is opposite from the third edge on the swatch.

[0133] The material data collection system may also perform image scaling on a swatch. Instead of a manual process using photo editing software to ensure the captured dimensions for a swatch are correct, the material data collection system may automatically adjust the swatch dimensions. For example, a capture guide has known dimensions for a cut-out portion. So, when the capture guide is used, the sample material that appears in the cut-out portion should have the same or similar dimensions as the known dimensions. Because of tilting or other image issues however, the dimensions shown in the image may be incorrect. For example, if a cut-out portion is known to be 0.05 meters in width and 0.05 meters in height but a sample material capture using the capture guide shows dimensions of 0.049 meters in width and 0.052 meters in height, the material data collection system may adjust the swatch dimensions. In the example, the material data collection system may stretch the swatch in width and shrink the swatch in height.

[0134] In an implementation, the material data collection system uses a captured image and, based on the captured image, creates a material swatch using automated techniques. This means that, although options may be provided by the material data collection system for a user to review and make adjustments to the material swatch created, once the user indicates to capture the image, the material data collection system may perform the rest of the steps to create the material swatch.

[0135] In an implementation, the material data collection system allows swapping or recoloring of colors in a captured image. For example, a user may like a material captured by the material data collection system, but not a color the material is in. The material data collection system allows the user to swap the color from the color found in the image to one that they select, without needing to procure a new version of the sample material in a new color. In an implementation, the material data collection system swaps colors using the following method:

[0136] (1) A captured image of a generated swatch or other image is retrieved by the material data collection system.

[0137] (2) The captured image is converted into grayscale or desaturated. While in grayscale, the captured image maintains the intensity information of the original captured image, but with one or more colors found in the captured image transformed into gray.

[0138] (3) The user may select one or more new colors in the material data collection system to replace the one or more colors. The user may select the one or more new colors directly using a LAB value or from a palate of colors.

[0139] (4) The material data collection system applies the one or more new colors, using the intensity information from the grayscale captured image, to change the one or more colors into the one or more new colors. For example, the material data collection system may use a multiply command. The multiply command goes through pixels of the captured image and uses intensity information from the grayscale multiplied by the new color to swap colors. If there are two or more colors to be swapped, step (4) may be repeated as necessary.

[0140] In an implementation, the material data collection system uses a device's digital camera and tilt sensor, for the features as described above. However, the material data collection system does not use the device's accelerometer or distance sensor. Further, the material data collection system may not need to use autofocus camera distance information, or augmented reality features provided by the device (i.e., Augmented Reality such as ARKit in Apple Inc.'s iOS™, ARCore in Google's Android®)The material data collection system may understand distances of objects captured in the image using only the photographed capture guide.

[0141] In an implementation, the material data collection system allows metadata storage of colors found in a captured image. This allows users to make meaningful comparisons of different swatches and search for different colors, even if the color identifiers used are from a different color space. The metadata may be searchable, so that users can retrieve different samples using color identifiers from different color spaces. For example, pixels in the captured image may be represented in the material data collection system in either red, green, and blue (RGB), cyan, magenta, yellow, and black (CMYB), or hex formats. However, designers or other users may be more familiar with other color spaces, such as PANTONE®, CSI's Color Library™, or CHROMA. The material data collection system may convert the pixel color information into their corresponding color in any of these color spaces and store the information as metadata associated with the captured image. For example, a pixel may include the color information RGB 0 35 156, HEX 00239C, or CMYK 988200. However, in the PANTONE color space, this color may be known as Dark Blue C.

[0142] In an implementation, the material data collection system may generate the color metadata automatically, without user input to specifically generate the metadata. For example, the metadata may be automatically generated when a swatch is created or after color or brightness correction has occurred. The material data collection system may also generate the color metadata based on a user's input. For example, the user may select an area of the captured image to convert the color information in the area into a color identifier in a selected color space. In an implementation, the material data collection system may provide approximate conversions for colors. For example, some color spaces may not include the entire spectrum of possible colors. The material data collection system may attempt to find a closest match for the selected area.

[0143] In an implementation, the material data collection system includes one or more features to transform digital images. The table below illustrates an example of various issues and techniques that may be used by the material data collection system to resolve the issues. The material data collection system may support or apply one, two, three, or any number of the features in various embodiments of the material data collection system. Other digital image issues not listed below may also be corrected by the material data collection system.